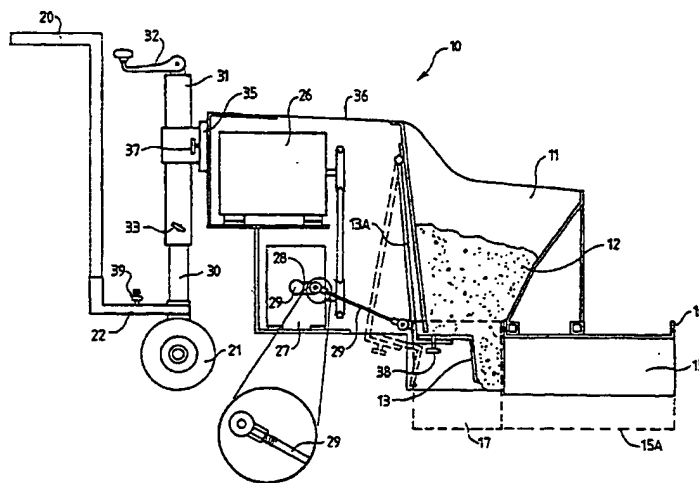




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : B28B 13/02, 3/04, 3/20, E01C 19/50	A1	(11) International Publication Number: WO 96/36467 (43) International Publication Date: 21 November 1996 (21.11.96)
<p>(21) International Application Number: PCT/AU96/00299</p> <p>(22) International Filing Date: 17 May 1996 (17.05.96)</p> <p>(30) Priority Data: PN 3016 18 May 1995 (18.05.95) AU</p> <p>(71) Applicant (for all designated States except US): EDGETEC INTERNATIONAL PTY. LTD. [AU/AU]; Unit 4, 107 Dandenong Road, Mt. Ommaney, QLD 4074 (AU).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): BLOSS, Regan, Brian [AU/AU]; Unit 4, 107 Dandenong Road, Mt. Ommaney, QLD 4074 (AU).</p> <p>(74) Agent: CULLEN & CO.; Level 12, 240 Queen Street, Brisbane, QLD 4000 (AU).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>	

(54) Title: CONCRETE EXTRUDING MACHINE



(57) Abstract

A concrete kerb forming machine (10) has a hopper (11) for receiving wet concrete (12). The concrete is extruded through a tunnel-shaped mould (15) by a pusher plate (13) to form kerbing having a sectional profile matching that of the mould (15). The mould (15) is reversibly mounted to the machine (10). Side skirts (17) can be mounted to the bottom of the hopper (11) to accommodate moulds (15A) of greater height. The machine (10) has a pair of steerable wheels (21) whose steering arms (22) are connected by a steering link (23) of adjustable length. The wheels may be locked in a particular orientation. The steering and wheel assembly is mounted on a rail (35) which is laterally adjustable relative to the body (36) of the machine, enabling the machine to operate adjacent walls. Pivotaly mounted height adjustment handles (32) are also provided on the machine (10) to allow the handles to be rotated even if in close proximity to a wall.

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"CONCRETE EXTRUDING MACHINE"

THIS INVENTION relates to apparatus for forming an elongate formation of desired sectional profile, by extruding concrete or other settable material through a mould. In particular, the invention is directed to an improved machine for forming continuous concrete edging, kerbing or the like.

BACKGROUND ART

Australian patent no. 620031 describes a machine for forming concrete kerbing. Wet concrete in a plastic state is fed into a hopper, and extruded onto the ground through a mould of desired cross sectional profile by a reciprocating pivoted pusher plate. The concrete extruded through the mould, when set, forms kerbing having a sectional profile matching that of the mould. Further, the reciprocating pusher plate serves not only to extrude concrete through the mould, but also to push the machine in the opposite direction. In this manner, the machine lays a moulded kerb as it propels itself along at the newly formed end of the kerb.

Although the machine described in patent no. 620031 operates effectively, it has been found that its construction and operation can be improved.

It is therefore an object of the present invention to provide an improved machine for extruding concrete or other settable materials.

SUMMARY OF THE INVENTION

In one broad form, the present invention provides a machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or other settable material in one direction through a generally tunnel-shaped mould member while moving in the opposite direction.

Preferably, the mould member has attachment means at both ends thereof by which it can be detachably mounted to the machine. Consequently, the reversible mould member enables the machine to form kerbing in either direction, even if the kerb has an asymmetrical profile.

The machine typically has a body defining a hopper which communicates with a ramming chamber at an inlet end of the mould member. Removable side walls or skirts are suitably mounted at opposite sides of the
5 ramming member to enable the machine to be used with mould members greater than standard height.

The machine has a steering assembly including at least one ground-engaging wheel. The steering assembly is adjustable in position laterally relative to
10 the body of the machine, to enable the machine to be used in close proximity to a wall or other vertical obstacle. Locking means are preferably provided to lock the steering assembly in position relative to the body of the machine.

15 Preferably, means are provided for locking each steerable ground-engaging wheel in a fixed orientation, to allow the machine to form kerbing in straight lines or kerbs of constant curvature.

Each wheel is preferably mounted on a
20 respective telescoping leg assembly having upper and lower portions which are relatively rotatable about a common longitudinal axis. The wheel is mounted to the lower portion, while the upper portion is fixed relative to the body of the machine. The wheel locking means
25 suitably comprises a locking member which passes transversely through one of the upper or lower members and engages the other member to thereby prevent relative rotation between them.

Typically, the machine has a pair of steerable
30 wheels each mounted on a respective wheel mount. Each wheel mount has a steering arm, the steering arms being connected by a steering link assembly of adjustable length. The steering link assembly suitably comprises a link rod having left and right handed threads at its
35 respective ends, thereby allowing the length of the steering link to be adjusted while it remains in place.

The concrete or other material is extruded through the mould member by pusher means. The pusher

means is preferably connected to a driving mechanism by a pusher rod assembly of adjustable length. The pusher rod assembly suitably comprises a connecting rod having left and right hand threads at its opposite ends, to enable
5 the length of the pusher rod assembly to be adjusted while it remains in place.

The pusher means preferably comprises a pusher plate which is removably connected to a plate support member which, in turn, is pivotally mounted to the body
10 of the machine.

The height of each leg assembly can be adjusted by rotating a handle at the top end thereof. Preferably, the handle is pivotally connected to the leg assembly so that it may be turned to an upright position. This
15 enables the height of the leg assembly to be varied even when the machine is close to a wall or other vertical obstacle.

In order that the invention may be more fully understood and put into practice, a preferred embodiment thereof will now be described with reference to the
20 accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view, from top and side, of a concrete moulding machine according to one
25 embodiment of the invention;

Fig. 2 is a perspective view from top side rear, of the moulding machine of Fig. 1;

Fig. 3 is a sectional elevational view of the machine of Fig. 1 in use; and

30 Fig. 4 is a perspective view of a detachable mould used with the machine of Figs. 1-3.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

As shown in the drawings, the concrete moulding machine 10 is of the same general construction as the
35 concrete moulding machine described in Australian patent no. 620031. The machine 10 comprises a hopper 11 in which wet concrete 12 of a desired consistency is loaded. The machine 10 also comprises a motor 26 which is belt-

coupled to a gearbox 27 having a crank arm 28 on its side-mounted output shaft 29. A push rod 29 is connected between a pusher plate 13 and the free end of the crank arm 28. The pusher plate 13 is hinged at its top end and
5 is caused to pivot back and forth about its hinge axis.

When the pusher plate 13 is pulled towards the front of the machine (shown on the left in Fig. 3), the concrete 12 in the hopper 11 falls under gravity into a ramming chamber at the front end of a mould member 15.
10 When the pusher plate 13 is pushed to the rear of the machine (shown on the right in Fig. 3), the concrete in the ramming chamber is pushed through the tunnel-shaped open-bottomed mould 15. The wet concrete is in a plastic state, and is extruded through the mould 15 to form a
15 continuous kerb having a sectional profile matching that of the mould 15. The concrete retains that profile when set.

Further, when the pusher plate 13 is pushed towards the rear of the machine 10, the reaction of the
20 newly extruded kerb to such motion causes the machine 10 to travel forwardly. The machine 10 therefore propels itself along the kerb as it is being formed.

The illustrated machine has several improved and/or advantageous features, and these are described in
25 more detail below.

Moulds used with concrete kerb forming machines typically have a transverse sectional profile which is not symmetrical about a central longitudinal vertical plane. Thus, when laying kerbing with such asymmetrical
30 section, the machine can only be operated in one direction. In some situations, it may be necessary or desirable to lay the kerbing in the opposite direction. Known machines are not bidirectional.

To overcome the above problem, the machine 10
35 is provided with a double ended mould 15. The mould 15 is provided with mounting plates 16 (Fig. 4) at both ends thereof, allowing either end to be mounted to the machine 10. A kerb with asymmetrical sectional profile may now be

laid in either direction, thereby enabling the machine to extrude kerbs in situations not previously possible.

The known kerb forming machine, described in Australian patent no. 620031, is designed to operate with
5 a mould of standard height, typically 90mm. In some cases, it is desirable to form higher kerbing. However, if a taller mould were used, the sides of the ramming chamber would be lifted above the ground, and the concrete would be squeezed out through the side gaps
10 between the side walls and the ground. Thus, each machine was limited to a maximum kerb height, dependent on the design of that particular machine.

The kerb forming machine of this invention is provided with detachable side walls or skirts 17 to
15 enable the machine 10 to accommodate a mould 15A having a height greater than the standard design height. Typically, the skirts 17 are flat metal sheets which are bolted to the inside of the left and right walls of the hopper 11 and extend from the hopper to the ground.
20 Preferably, the skirts 17 are adjustably mounted to the hopper 11 to accommodate moulds 15A of different height.

The skirts 17 ensure that when higher than standard moulds 15A are used, there are no side gaps between the hopper 11 and the ground, thereby retaining
25 concrete within the ramming chamber for extrusion through the mould 15A.

If required, the pusher plate 13 can be provided with an extension plate, connected thereto, for extending the depth of the pusher plate when higher
30 moulds are used.

The machine 10 has steerable wheels 21 rotatably mounted on respective wheel mounts. The machine 10 is typically provided with a handle 20 for steering the wheels 21. This enables the machine 10 to
35 track a curved path and form concrete kerbing of curved configuration. Each wheel mount has a respective steering arm 22. The handle is connected to one steering arm 22, and the two steering arms are connected by a

steering link 23. The steering link 23 is provided with threaded ends which are each threaded into a socket in a respective end fitting 39. The end fittings 39 are pivotally connected to respective steering arms 22, typically by ball-and-socket mountings.

In conventional machines, both threaded ends of the steering link 23 have the same thread. Thus, when adjustment of the length of the steering link 23 was required, it was necessary to remove the steering link 23 (and its associated end fittings) from the machine.

The steering link 23 of the illustrated embodiment is provided with threaded ends which have opposite threads, i.e. left hand and right hand threads, respectively. This allows for adjustment of the spacing of the wheels 21 while the steering link 23 remains in place on the machine. The locking nut 25 is first loosened, and the steering link 23 is rotated, either clockwise or anticlockwise as appropriate, in order to lengthen or shorten the overall length of the steering link, and hence the spacing between the steering arms 22. Once the desired spacing has been achieved, the locking nut 25 is simply retightened.

In an alternative arrangement (not shown), the steering link 23 includes an adjustable turnbuckle.

In conventional machines, the push rod 29 is a solid rod, of fixed length. Since the length of the push rod 29 cannot be adjusted, wear and tear cannot be compensated for. The machine 10 shown in the illustrated embodiment has an adjustable rod 29, similar to the adjustable steering link 23. The threaded ends of the push rod 29 have left and right handed threads, respectively. The distance between the pusher plate 13 and the crank arm 28 can be adjusted accurately while the push rod 29 remains in place to accommodate wear and tear.

Each wheel mount is located at the bottom end of a respective wheel strut which is in the form of a telescoping leg having a post 30 slidable and rotatable

within a sleeve 31. Although each sleeve 31 is fixed relative to the machine, each post 30 may rotate within its respective sleeve 31 to allow the wheels 21 to turn.

When forming kerbing of straight line configuration, or of constant curvature, it is necessary to keep the steering handle 20 at a fixed orientation. In conventional machines, the operator is required to manually hold the handle steady at the fixed orientation. This is very difficult to achieve while the machine is in operation and moving.

The machine of the illustrated embodiment is provided with a positive locking mechanism to maintain the wheels in a fixed orientation. As shown in Fig. 1, the locking mechanism may suitably comprise a threaded "T" fitting 33 which is threaded into an opening in the sleeve 31. By screwing the T fitting into the sleeve 31 to engage the post 30, the T fitting 33 prevents relative rotation between the post 30 and sleeve 31, thereby maintaining the respective wheel 21 in a fixed orientation relative to the machine. This eliminates human error in steering, and allows the kerbing to be formed in uniform curves and straight lines.

The wheel struts are mounted to a rail 35 which is slidably adjustable relative to the body 36 of the machine. In this manner, the steering and wheel assembly can be located fully to the left or right of the body 36 of the machine, enabling the machine to pass closely alongside vertical obstacles such as walls. This enables kerbing to be formed close to such vertical obstacles.

The machine 10 further comprises three locking "T" fittings 37 threaded into respective openings in rail 35. The threaded T fittings 37 are located at either end of rail 35 and in the middle thereof. Once the rail 35 has been located at the desired position relative to the body 36 of the machine, the appropriate "T" fitting is threaded through rail 35 into the body 36, to lock the body 36 in position relative to rail 35.

The height of each strut, and hence the height

of the machine, can be varied by adjustment of the relative axial positioning of the post 30 and sleeve 31, using respective height adjustment handles 32. In conventional machines, the handles 32 are permanently in a horizontal orientation. Thus, when the handles 32 were rotated, they pass outside the lateral boundaries of the machine. If the machine is alongside a vertical obstacle such as a wall, the nearest handle 32 cannot be rotated to adjust the height of the machine.

The machine shown in the illustrated embodiment has pivotally mounted handles 32 which can be moved from a normal horizontal orientation to an upright orientation. In its upright configuration, each handle 32 can still be rotated to adjust the height of the machine without being impeded by an adjacent wall or other obstacle.

The pusher assembly in the kerb forming machine described in Australian patent no. 620031 had a unitary pusher plate extending from its upper hinged mounting to its bottom edge. The machine 10 of the preferred embodiment has a removable pusher plate 13 which is secured to the remainder of the pusher assembly 13A by one or more locking "T" nuts 38. This allows the pusher plate 13 to be removed, quickly and easily, from the remainder of the pusher assembly 13A, e.g. for cleaning and/or replacement.

The foregoing describes only one embodiment of this invention, and modifications which are obvious to those skilled in the art may be made thereto without departing from the scope of the invention as defined in the following claims.

CLAIMS:

1. A machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or other settable material in one direction through a
5 generally tunnel-shaped mould member while moving in the opposite direction, characterised in that the mould member has attachment means at both ends thereof by which it can be detachably mounted to the machine.
2. A machine as claimed in claim 1, wherein said
10 mould member has an asymmetrical transverse section.
3. A machine as claimed in claim 1 or 2, wherein the machine has a hopper communicating with a ramming chamber at an inlet end of the mould member, the machine further comprising removable side wall members mounted at
15 opposite sides of the ramming chamber.
4. A machine as claimed in any preceding claim, the machine having a pair of ground-engaging wheels each mounted on a respective wheel mount, each wheel mount having a steering arm, the steering arms being connected
20 by a steering link assembly of adjustable length.
5. A machine as claimed in claim 4, wherein the steering link assembly comprises a link rod having threaded ends, each end being threaded into an end fitting pivotally connected to a respective steering arm,
25 the threads at the ends of the link rod being of opposite senses.
6. A machine as claimed in any preceding claim, wherein the concrete or other settable material is extruded through the mould member by reciprocating pusher
30 means, the pusher means being connected to driving means by a pusher rod assembly of adjustable length.
7. A machine as claimed in claim 6, wherein the pusher rod assembly comprises a connecting rod having threaded ends which are threaded into fittings connected
35 respectively to the pusher means and the driving means, the threads at the ends of the connecting rod being of opposite senses.
8. A machine as claimed in any preceding claim,

wherein the machine has at least one steerable ground-engaging wheel, the machine further comprising means for locking the steerable wheel in a fixed orientation.

9. A machine as claimed in claim 8, further
5 comprising a telescoping leg assembly having upper and lower portions which are relatively rotatable about a common longitudinal axis, the wheel being mounted to the lower portion, and the upper portion being fixed relative to the body of the machine, said locking means comprising
10 a locking member passing transversely through one of the upper or lower members and engaging the other member to prevent relative rotation between them.

10. A machine as claimed in claim 1 or 2, wherein the machine comprises a body having a hopper, and a
15 steering assembly, the steering assembly being adjustable in position laterally relative to the body of the machine, further comprising locking means for locking the steering assembly in position relative to the body of the machine.

20 11. A machine as claimed in any preceding claim, the machine having at least one supporting leg assembly of adjustable height, each supporting leg assembly having a rotatable handle at its upper end for varying the height of the leg assembly, each said handle being
25 pivotally mounted to its respective leg assembly and movable to a generally upright position.

12. A machine as claimed in claim 1 or 2, the machine having a pusher assembly for extruding the concrete or other settable material through the mould
30 member, the pusher assembly comprising a pusher plate removably mounted to a pivotally mounted plate support member.

13. A machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or
35 other settable material in one direction through a generally tunnel-shaped mould member while moving in the opposite direction, the machine having a hopper communicating with a ramming chamber at an inlet end of

the mould member, characterised in that the machine further comprises removable side wall members mounted at opposite sides of the ramming chamber.

14. A machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or other settable material in one direction through a generally tunnel-shaped mould member while moving in the opposite direction, said machine having a pair of ground-engaging wheels each mounted on a respective wheel mount, each wheel mount having a steering arm, the steering arms being connected by a steering link assembly of adjustable length.

15. A machine as claimed in claim 14, wherein the steering link assembly comprises a link rod having threaded ends, each end being threaded into an end fitting pivotally connected to a respective steering arm, the threads at the ends of the link rod being of opposite senses.

16. A machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or other settable material in one direction through a generally tunnel-shaped mould member while moving in the opposite direction, wherein the concrete or other settable material is extruded through the mould member by reciprocating pusher means, the pusher means being connected to driving means by a pusher rod assembly of adjustable length.

17. A machine as claimed in claim 16, wherein the pusher rod assembly comprises a connecting rod having threaded ends which are threaded into fittings connected respectively to the pusher means and the driving means, the threads at the ends of the connecting rod being of opposite senses.

18. A machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or other settable material in one direction through a generally tunnel-shaped mould member while moving in the opposite direction, wherein the machine has at least one

steerable ground-engaging wheel, the machine further comprising means for locking the wheel in a fixed orientation.

19. A machine as claimed in claim 18, further
5 comprising a telescoping leg assembly having upper and lower portions which are relatively rotatable about a common longitudinal axis, the wheel being mounted to the lower portion, and the upper portion being fixed relative to the body of the machine, the locking means comprising
10 a locking member passing transversely through one of the upper or lower members and engaging the other member to prevent relative rotation between them.

20. A machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or
15 other settable material in one direction through a generally tunnel-shaped mould member while moving in the opposite direction, wherein the machine comprises a body having a hopper, and a steering assembly, the steering assembly being adjustable in position laterally relative
20 to the body of the machine, further comprising locking means for locking the steering assembly in position relative to the body of the machine.

21. A machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or
25 other settable material in one direction through a generally tunnel-shaped mould member while moving in the opposite direction, the machine having at least one supporting leg assembly of adjustable height, each supporting leg assembly having a rotatable handle at its
30 upper end for varying the height of the leg assembly, characterised in that each said handle is pivotally mounted to its respective leg assembly and movable to a generally upright position.

22. A machine for producing an elongate formation, such as a kerb or the like, by extruding concrete or
35 other settable material in one direction through a generally tunnel-shaped mould member while moving in the opposite direction, the machine having a pusher assembly

for extruding the concrete or other settable material through the mould member, the pusher assembly comprising a pusher plate removably mounted to a pivotally mounted plate support member.

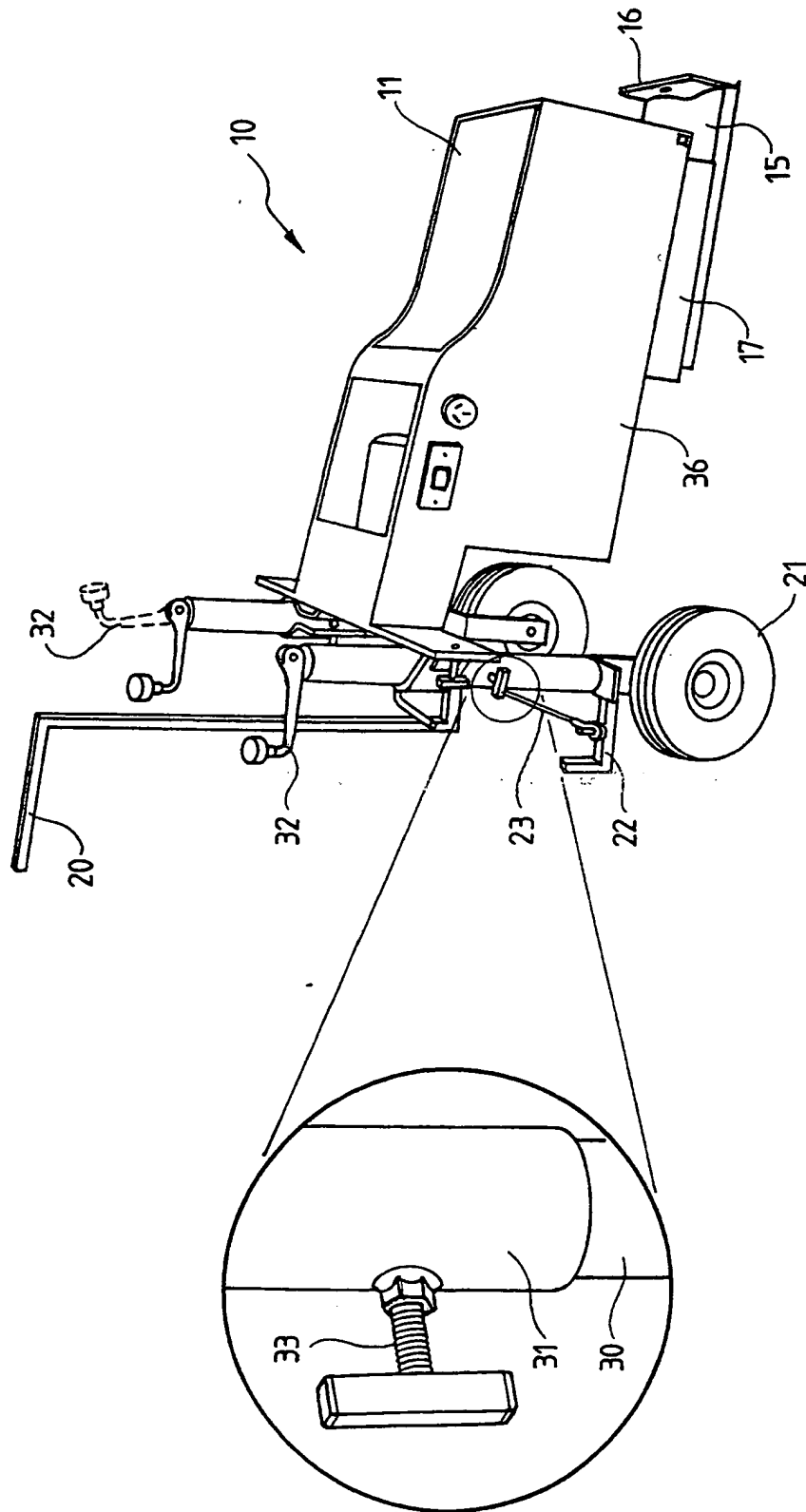


Fig.1

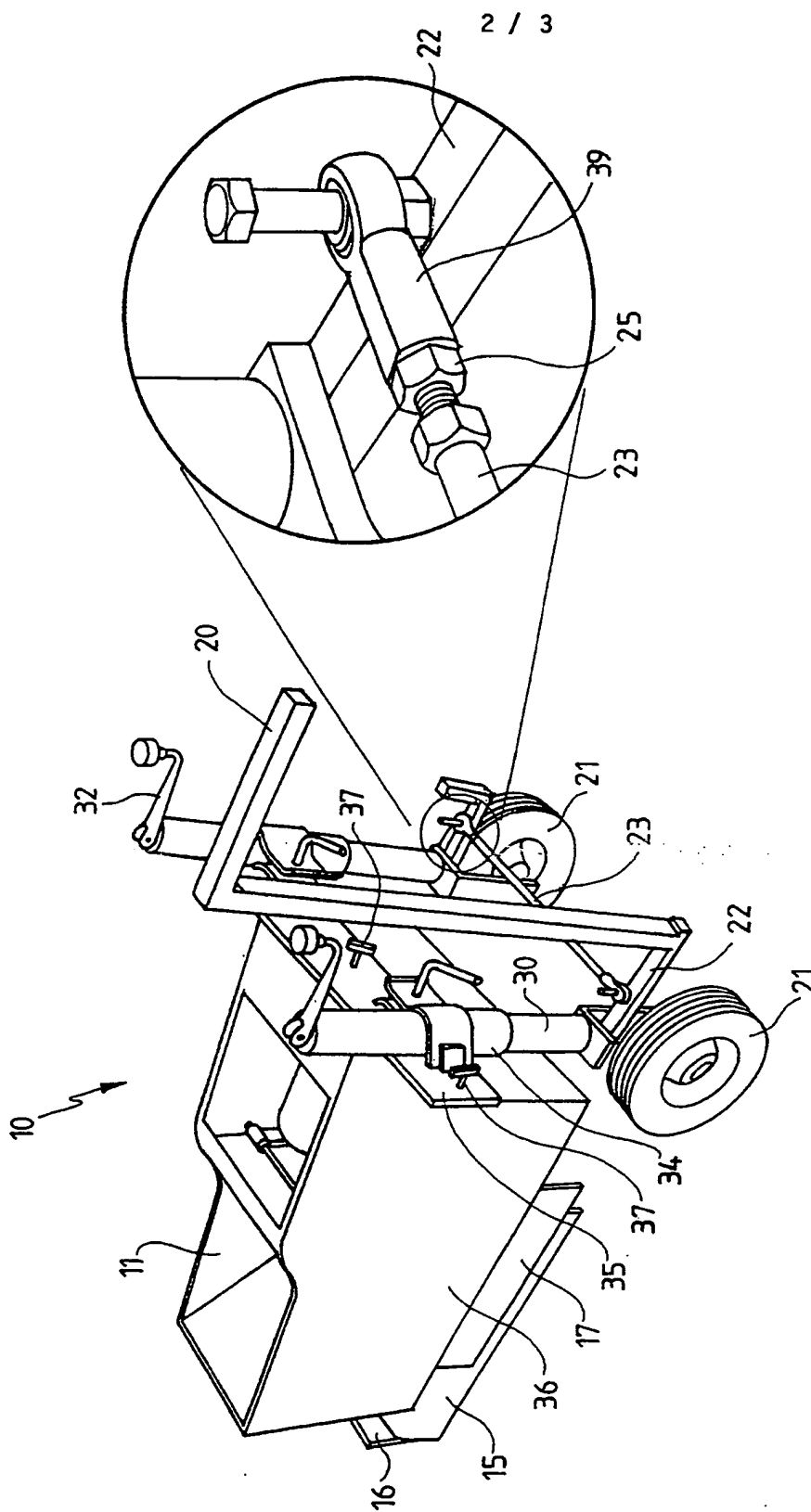


Fig. 2

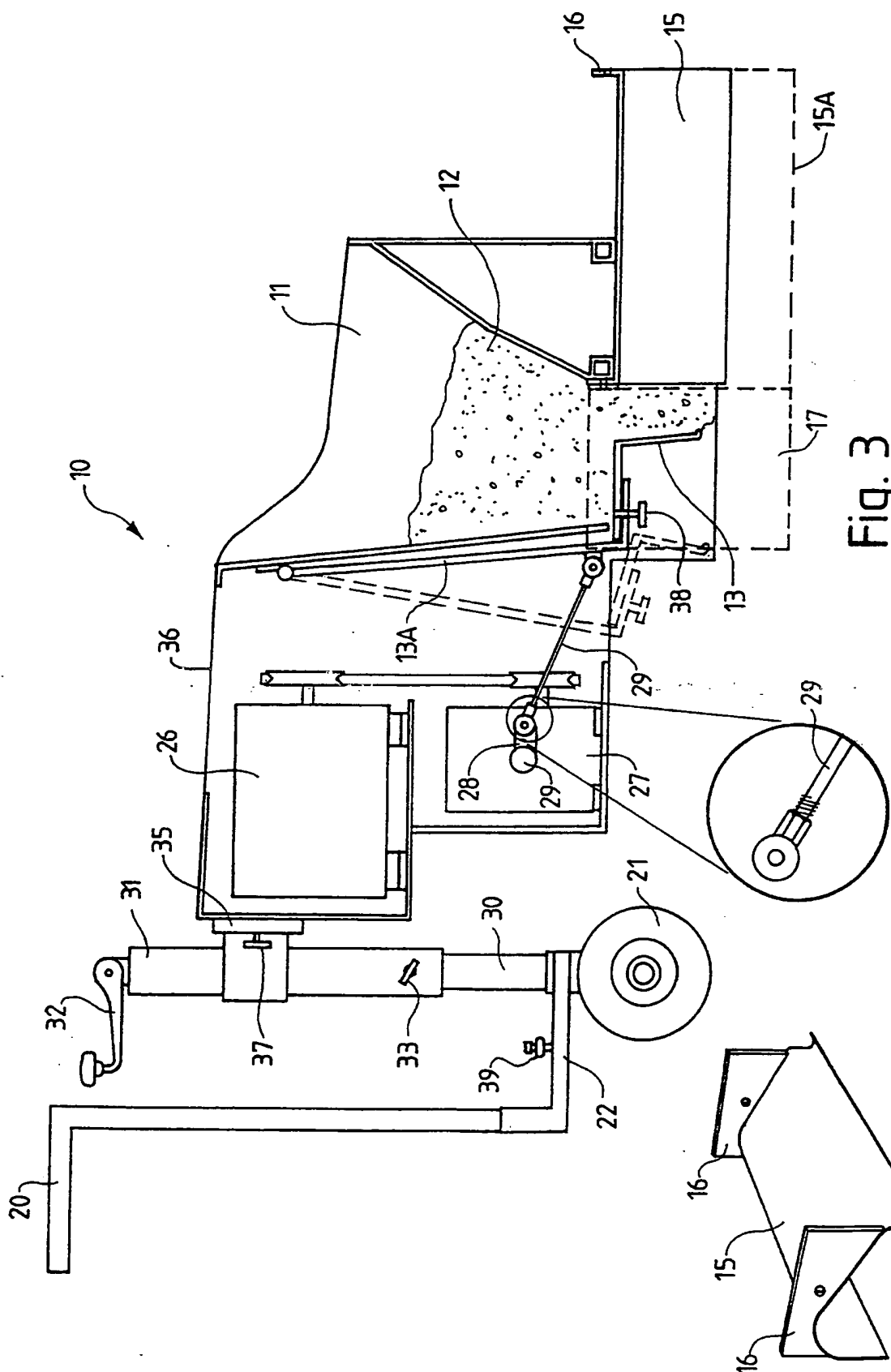


Fig. 3

Fig. 4

INTERNATIONAL SEARCH REPORT

 International Application No.
 PCT/AU 96/00299

A. CLASSIFICATION OF SUBJECT MATTER		
Int Cl ⁶ : B28B 13/02, 3/04, 3/20; E01C 19/50		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) B28B 13/02, 13/04, 3/20, 3/24; E01C 19/50, 19/46		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DERWENT		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 81150/82 A (DOUGLAS STUART LAWSON) 8 September 1983 See whole document	1, 3-4, 6, 9-11, 13-14, 16, 18-21
X	US 4 566 823 A (MAY) 28 January 1986 See whole document	1, 4, 6, 9-11, 14, 16, 18-21
X	AU 15049/83 A (FRANCIS WILLIAM QUINTEL) 1 December 1983 See claims and figures	1, 4, 10, 14, 18-20
X	AU 56437/80 (528167) B (RICHARD CLIVE EGGLETON) 18 September 1980 See whole document	3-4, 9-11, 13-14, 18-21
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 1 August 1996		Date of mailing of the international search report 7 AUGUST 1996
Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (06) 285 3929		Authorized officer m. oelg J. DEUIS Telephone No.: (06) 283 2146

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 16008/88 (620031) B (WASILLA PTY LTD) 17 November 1988 See whole document	4, 9-12, 14, 18-22

INTERNATIONAL SEARCH REPORT

I: national Application No.
PCT/AU 96/00299

Box 1 Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See supplemental box II

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 96/00299

Box II OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING (cont'd)

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are EIGHT INVENTIONS.

1. Claims 1-12 are directed to an apparatus for producing an elongated formation of extruded concrete or like material. The apparatus is characterised in that the mould member has attachment means by which it can be detachably mounted to the apparatus. It is considered the feature of this detachable mould member associated with the apparatus comprises a first "special technical feature".
2. Claim 13 is directed to an apparatus for producing an elongated formation of concrete or like material via extrusion. The apparatus is characterised by having a hopper associated with a ramming chamber at the inlet end. Further the ramming chamber has removable side wall members. It is considered the use of a hopper associated with a ramming chamber, comprises a second "special technical feature".
3. Claims 14-15 are directed to an apparatus for producing an elongated formation of extruded concrete or like material. The apparatus is characterised in that the apparatus has a pair of ground-engaging wheels each having steering arms. The steering arms are connected by an adjustable steering link. These features stated above, are considered to comprise a third "special technical feature".
4. Claims 16-17 are directed to an apparatus for producing extruded concrete or the like elongated forms. The apparatus is characterised in that settable material is extruded by a reciprocating pusher means, which is associated with a driving means via a pusher rod assembly of adjustable length. This feature of the reciprocating pusher means, is considered a fourth "special technical feature".
5. Claims 18-19 are directed to an apparatus for producing an elongated formation by extruding concrete or other settable material. The apparatus is distinguished by having at least one steerable ground wheel with a means for locking the wheel in a fixed orientation. It is considered the feature of this steerable ground wheel comprises a fifth "special technical feature".
6. Claim 20 is directed to an apparatus for producing an elongated concrete or the like form via extrusion. The apparatus is characterised in that the apparatus comprises a body having a hopper and a steering assembly that is adjustable and lockable. It is considered the hopper and steering assembly features comprise a sixth "special technical feature".
7. Claim 21 is directed to an apparatus for producing via extrusion, an elongated concrete or the like settable form. The apparatus is characterised in that the apparatus has at least one supporting leg assembly of adjustable height via a pivotally attached, rotating handle. These features comprise a seventh "special technical feature".
8. Claim 22 is directed to an apparatus for producing an elongated formation of extruded concrete or like material. The apparatus is characterised in that a pusher assembly is utilized. The pusher assembly comprises a removably mounted pusher plate. It is considered the features of this pusher assembly associated with the apparatus, comprises an eighth "special technical feature".

Since the abovementioned groups of claims do not share either of the technical features identified, a "technical relationship" between the inventions, as defined in PCT Rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No.
PCT/AU 96/00299

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
AU	56437/80 B	NZ	193138				
AU	16008/88 B	CA	1325510	NZ	224591	US	4936763
							END OF ANNEX

